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Ken YAMADA
Singapore Management University, kenyamada@smu.edu.sg

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Ken Yamada†

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Abstract

There has been increasing concern about the influence of elements of family background on children's future outcomes in Japan. This paper empirically examines the long-term impact of family background, including sibling composition and parental attributes, and reveals how these elements of Japanese women's family backgrounds affect their educational attainment and investment, labor market outcomes, family formation, and spousal characteristics.

Keywords: sibling composition, family background, intergenerational mobility, family formation, assortative mating

JEL Classification: J12, J13, J24, J31

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†School of Economics, Singapore Management University, 90 Stamford Road, Singapore 178903; Tel: +65 6828 1914; Fax: +65 6828 0833; E-mail: kenyamada@smu.edu.sg

1 Introduction

Inequality persists from one generation to the next. The extent to which economic and social status is transmitted across generations depends on the influence of family background on future economic and social outcomes. Growing concern about the increasing influence of family background seems to be the reason behind the expansion of child benefits and tuition subsidies after the recent change of government in Japan.[1] Some evidence, in fact, suggests that educational choices have become more susceptible to credit constraints, under which family background plays a more important role in determining children's future outcomes. First, the costs of attending a national university jumped six fold in real terms from 1975 to 2000 (Figure 1).[2] The OECD (2010) places Japan in the group of countries with high tuition fees and less financial support for students when classifying countries into four groups according to tuition fees and financial support systems for students.[3] Second, more than 90% of the sample used for the analysis in this paper relied on parents for a large part or almost the entire amount of their tuition fees and living expenses (Table 1). Finally, when educational attainment is classified into three groups according to parental permanent income, 38.7% of those in the high-income group have university degrees, compared to only 8.6% (20.7%) of those in the low-income (middle-income) group (Table 2). In the light of these circumstances, this paper provides empirical evidence of how family background affects educational attainment and how its impact has changed over recent decades. The paper also examines parental investment in students' preparing for entrance examination or in their early education to provide an explanation of the difference in educational attainment by family background.

[1] Under the new child benefit scheme of 2010, households with children under the age of 15 receive monthly allowances of 13,000 yen per child without an income limit. Under the new tuition waiver program of 2010, tuition is waived for students in public high schools, and tuition aid is provided to students in private high schools.

[2] Costs for universities are calculated as the sum of enrollment fees and tuition fees for four years, normalized by the consumer price index at the 2000 level. The ratio of costs for national universities to the average costs for private universities was 23.5% in 1975 but rose to 63.6% in 2000. It has been uncommon for Japanese universities to offer to exempt students from tuition fees or grant generous scholarships or student loans on a merit basis, although there has been a recent trend of introducing merit-based scholarship programs and tuition exemptions as a way to attract students amid the declining younger population. Existing scholarship programs have not expanded in recent decades. The Japan Scholarship Foundation provides scholarships that are most accessible to college and graduate students; however, the proportion of interest-free scholarships from the Japan Scholarship Foundation has dramatically decreased due to a rise in the previous outstanding loans of scholarship recipients and a drop in government subsidies. The Ministry of Education, Culture, Sports, Science, and Technology (2008) reports that, in 2007, 9.2% of college students received interest-free scholarships and 19.7% received interest-bearing scholarships from the Japan Scholarship Foundation.

[3] The other three groups are Nordic countries, which have no or low tuition fees and generous financial support; Anglo-Saxon countries, which have high tuition fees and generous financial support; and continental European countries, which have low tuition fees and less financial support.

Becker and Lewis (1973), Becker and Tomes (1976), and Becker (1991) provide a theoretical foundation for investigating parental investment in children's education. The underlying idea of the theory is that a tradeoff exists between quantity and quality of children; that is, all else being equal, sibship size should be negatively associated with educational attainment. Subsequent empirical studies support this hypothesis (Rosenzweig and Wolpin, 1980; Hanushek 1992). The theoretical model can be extended such that parental preferences and the education production function are allowed to differ by birth order and gender (Behrman, Pollak, and Taubman, 1982, 1989). In this case, birth order and the gender composition of siblings can affect children's future achievement, holding sibship size constant.[4] The main interest in these studies lies in the relation between sibling structure and children's educational attainment; thus, parental attributes typically serve as controls in the econometric models.[5] The relation between parental attributes and children's outcomes is, however, an equally important issue. There is considerable interest in the effects of parental education (Ermisch and Francesconi, 2001; Behrman and Rosenzweig, 2002), maternal age at birth (Rosenzweig and Wolpin, 1995), and parental income (Kane, 1994) on educational attainment. This paper considers all these factors that can determine children's future outcomes.

While voluminous research has been conducted regarding the impact of family background on educational attainment, less work has been done until recently regarding its impact on educational investment; labor market outcomes, such as wages and occupation (Olneck and Bills, 1979; Kessler, 1991); family formation, such as fertility (Fernández and Fogli, 2006; Booth and Kee, 2009); and family income (Chadwick and Solon, 2002).[6] However, each of the outcomes should be worth investigating to understand the several implications of family background effects in the labor

[4]A first-born child benefits from educational investment more than later-born children in the United States (Behrman and Taubman, 1986). The number of brothers decreases years of education, but the number of sisters does not necessarily decrease years of education in Taiwan (Parish and Willis, 1993). The number of brothers reduces the probability of university enrolment more than the number of sisters in Japan (Ono, 2004). The presence of sisters decreases women's educational attainment in the United States (Butcher and Case, 1994).

[5]Parental attributes are sometimes subsumed in common effects shared by siblings and treated as a family fixed effect (Griliches, 1979).

[6]However, extensive literature exists on the production function for cognitive achievement in children. See Todd and Wolpin (2003) for a survey. Vast literature exists on intergenerational transmission of economic status. See Solon (1999) and Black and Devereux (2010) for surveys on intergenerational mobility, Ueda (1999) for intergenerational earnings mobility in Japan, and Francesconi and Nicoletti (2007) for intergenerational transmission of occupational prestige in the United Kingdom. Sociologists and demographers have accumulated evidence on intergenerational transmission of fertility patterns. For example, Kahn and Anderson (1992) show that daughters of teen mothers are more likely to give birth during the teen years in the United States. They also find that teen childbearing occurs within marriage for the majority of whites and outside marriage for the majority of blacks.

market and the marriage market. First, success in the labor market may be associated with family background via human capital accumulation or nepotism. Second, given the empirical evidence that sibship size decreases educational attainment, fertility is a conceivably important element in the intergenerational transmission process. Third, because births outside marriage are still rare,[7] completed fertility hinges on the timing of marriage in Japan, and therefore, family background may influence the timing of marriage. In fact, the probability of staying single becomes lower as the number of sisters or the number of brothers increases, while it becomes higher as maternal education or paternal education increases (Figure 2). Lastly, in the light of the observed assortative mating with respect to educational attainment (Table 3), family background can influence whom one marries. Assortative mating is presumably a key factor contributing to the intergenerational transmission of economic status, but relatively little is known about how each element of family background can affect family formation and spousal characteristics. Using an extensive set of family background variables, this paper provides a comprehensive picture of the long-term impact of family background on economic and social outcomes for Japanese women.

The analysis of this paper reveals that family background, including sibling composition and parental attributes, indeed influences educational attainment and investment, labor market outcomes, and family formation. The impact of sibship size and parental income on university degrees has increased along with rising educational expenses, while the differential impact of brothers and sisters has disappeared for the younger cohorts. The influence of family background appears both in the labor market and in the marriage market. Significant differences by family background are found in the economic and social status of not only the woman but also that of her future husband.

The rest of this paper is organized as follows. The next section describes the data used in the analysis, discusses econometric issues that can arise in the analysis of the paper, and presents the preliminary results on the relation between family background and children's outcomes. Section 3 introduces econometric models to examine the impact of family background on various economic outcomes. Section 4 provides empirical results for the influences of the key elements of family background. The final section summarizes the main findings of the paper.

[7] Cohabitation has also been rare in Japan. See Raymo, Iwasawa, and Bumpass (2009) and references therein for details.

2 Data

2.1 Family background variables

This study uses data from the Japanese Panel Survey of Consumers (JPSC) for the period from 1993 to 2004. The JPSC has surveyed a nationwide representative sample of women every year since 1993. The original cohorts comprise 1,500 women aged 24 to 34 in 1993 (i.e., born between 1959 and 1969), and the new cohorts comprise 500 women aged 24 to 27 in 1997 (i.e., born between 1970 and 1973) and 836 women aged 24 to 29 in 2003 (i.e., born between 1974 and 1979). The sample used for the analysis comprises 2,270 individuals whose parents are both alive, of which 1,178 were born between 1959 and 1969 and 1,092 were born between 1970 and 1979. The younger cohorts include the second baby-boomers born between 1971 and 1974.

The JPSC contains a wide array of information about family background including the number of brothers, the number of sisters, birth order among sisters, the highest degree received by father and mother, and the prefecture where the respondent spent the longest period of time during compulsory education, all of which are given by nature and are invariant over time. Other available information includes father's and mother's age, father's occupation,[8] and parental annual income. Table 4 shows that the distribution of the number of sisters is approximately symmetrical to that of the number of brothers. The symmetric distribution implies that sex-selective abortion has not been practiced in Japan, unlike in some other Asian countries where son preference is strong. Eldest daughters account for 71.0% of the individuals in the sample, and second daughters account for 24.8%. The proportion of those who hold some post-secondary academic degree is 57.1%, whereas 23.5% of their fathers and 16.5% of their mothers hold some post-secondary academic degree. In the course of popularization of higher education among women, the proportion of those who hold a university degree has increased from 4% for the mothers' generation to 16% for the current generation. The average maternal age at birth is 27.4 years, and the proportion of teenage births is only 1.0%.

[8] Father's occupation is his current occupation if he has not yet retired, or his previous occupation otherwise. No information is available about maternal occupation. Tanaka (2008) examines the effects of maternal employment on children's educational attainment using the Japanese General Social Surveys.

2.2 Intergenerational correlations

The analysis begins by presenting intergenerational correlations between parent and child and between parent and child's spouse. There are several econometric issues that arise in calculating intergenerational correlations (Solon, 1992), and these problems are major concerns in the subsequent main analysis. The issues are known as the life-cycle bias, the attenuation bias, and the selection bias. First, because neither the lifetime income streams nor the entire career history is usually observed, economic or social status is typically assessed by income or occupation at a given point in time, and thus, it depends on the stage of life at which the individual is surveyed. To correct for the life-cycle bias, the age of each family member and its square are partialled out. For a similar reason, the value in the latest year of the survey is used for the number of children, and the age and its square are partialled out in calculating the intergenerational correlation in fertility. Second, economic or social status at a given point in time consists of transitory and permanent components. To mitigate the attenuation bias caused by the transitory component, the average value taken over the sample period is used for wages, income, and occupational prestige scores. Finally, although the sample used here is not a particular subgroup of population, such as twins, the selection bias can occur due to missing values as a consequence of selection into employment or marriage. The selection problem is alleviated here by aggregating measures of economic and social status over the sample period and is treated more formally in the next section.

The children's outcomes considered in Table 5 are educational attainment, hourly wages, occupational prestige, the timing of marriage, family size, and husband's income and occupational prestige.[9] Hourly wages represent productivity and economic status, while occupational prestige represents social status and job amenity for which wages do not fully account. Occupational prestige is measured using the Treiman scale (Treiman, 1977). The appendix describes the details of how the data on occupational prestige scores are constructed. The correlation coefficient between occupational prestige scores and hourly wages is 0.40. Husband's income includes earnings, business income, property income, and family transfers but excludes government transfers, such as child care benefits and social security benefits. The intergenerational transmission of edu-

[9]Those who have never been employed during the sample period or never married until the latest year for which data are available are not included in calculating the intergenerational correlations of wages, occupational prestige, or age at first marriage in Table 5, but are included in the subsequent regression analyses.

cational attainment is relatively strong, as educational attainment can be more directly transmitted by parental choices. The impact of parental income continues in the labor market, as represented by its correlations with wages and occupational prestige. Family formation patterns are also correlated between parent and child, although the degree to which they are transmitted is weaker. Spousal income and occupational prestige are correlated with parental income, despite the absence of direct links, indicating that assortative mating in the marriage market plays a role in intergenerational mobility.[10]

3 Econometric Framework

The objective of this paper is to examine the impact of family background on educational attainment and investment, labor market outcomes, family formation, and spousal characteristics. Cross-sectional regressions are conducted for the analysis except for that of marriage. Time-varying variables, such as wages, income, occupational prestige, children, and age, are treated in the ways described in the previous section.

First, the linear regression model and binary and ordered probit models are used to analyze the impact of family background on educational attainment and investment.

$$y_{1i}^{*} = z_{1i}\beta_1 + z_{2i}\beta_2 + x_i\beta_3 + u_{1i}, \tag{1}$$

where y_1^* is in general a latent variable that represents parental willingness to invest in children's education; z_1 is a vector of sibling composition that includes dummies for the number of sisters, the number of brothers, and birth order; z_2 is a vector of parental characteristics that includes dummies for mother's years of education and father's years of education, maternal age at birth, maternal age at birth squared, log parental income, father's age, and father's age squared; x is a vector of other observed characteristics that includes age, age squared, prefecture dummies for where one spent the longest period of time during compulsory education, log prefectural real GDP

[10] Social status is also transmitted across generations. The age-adjusted correlation coefficients in occupational prestige are 0.207 with a *p*-value of zero between parent and child and 0.260 with a *p*-value of zero between parent and child's spouse.

at the subject's age of 16,[11] and the high school student–teacher ratio at the subject's age of 16;[12] u is the error term; and i indexes individuals.[13] For the analysis of educational attainment, the outcome variables used are the number of years of completed education and a binary response variable for whether one has completed a four-year college degree or higher. For the analysis of educational investment, the outcome variables used are a binary response variable for whether one attended a preparatory school for university entrance examination as well as an ordered response variable that takes a value of two if one attended both private tutoring schools and enrichment courses, a value of one if one attended either, and a value of zero if one attended neither. The error term is assumed to be normally distributed in the discrete choice models. The linear and square terms for maternal age at birth are included to account for a rise or decline in its partial effect. If children's future achievement is hindered by early or late childbearing, the "optimal" age can be estimated by the turning point. Prefecture dummies and prefectural GDP are included to isolate the influence of family background owing to regional and macroeconomic effects. The high school student–teacher ratio is included to control for the quality of education in the analysis that examines changes in the impact of family background by cohort.

The impact of sibling composition is specified in two ways. First, it can be described by $z_1\beta_1 = \sum_j \left(\beta^s_{1j} d^s_j + \beta^b_{1j} d^b_j\right)$, where d^s_j is an indicator variable for whether the number of sisters is j, and d^b_j is an indicator variable for whether the number of brothers is j. This specification allows the effect of an additional sister (brother) to vary with the number of sisters (brothers). Whether educational investment is made preferentially in sons is an interesting question, because such preference results in persistent gender inequality. The null hypothesis to test whether the gender composition of siblings matters can be written as the joint hypothesis: $\beta^s_{1j} = \beta^b_{1j}$ for all j. Alternatively, after conditioning on the number of siblings, birth order effect can be incorporated as $z_1\beta_1 = \beta^o_1 d^o + \sum_k \beta^{bs}_{1k} d^{bs}_k$, where d^o is an indicator variable for whether one is the eldest daughter, and d^{bs}_k is an indicator variable for whether the number of siblings is k. Birth order traditionally

[11] The prefectural GDP data are available from the Annual Report on Prefectural Accounts.

[12] Data on the number of students and teachers are available from the Basic Survey on Schools. National, prefectural, and private high schools are all included in the calculation of the student–teacher ratio at the age of 16. Class size was set at 45 students from 1964 to 1979 and at 40 students from 1980 to 2001 for public primary schools, junior high schools, and high schools in Japan.

[13] Although no ability measure is available in the data used in this study, test scores, which are typical proxies for innate ability, would not serve as good controls here because the difference in such measures is attributable to family background.

plays a role in determining intergenerational transfers. The inclusion of birth order can potentially change the estimated coefficients on other family background variables.

Second, the sample selection model is used to examine the relation between family background and labor market outcomes.

$$y_{2i} = z_{1i}\gamma_1 + z_{2i}\gamma_2 + x_i\gamma_3 + u_{2i}, \tag{2}$$

$$s_i = 1\left[w_i\delta + u_{3i} > 0\right], \tag{3}$$

where y_2 is log hourly wages or log occupational prestige scores; s is the indicator variable that equals one if y_2 is observed during the sample period and zero otherwise; w is a vector of observed characteristics that includes the number of siblings, mother's years of education, father's years of education, maternal age at birth, maternal age at birth squared, log parental income, age, age squared, father's age, father's age squared, log prefectural real GDP at the age of 16, and the unemployment rate in the region where one spent the longest period of time during compulsory education;[14] and u_2 and u_3 are the jointly normally distributed error terms. The regional unemployment rate serves as an excluded instrument. The regional unemployment rate is significant with a *p*-value of zero in all regressions. The model above is also used for the analysis of spousal characteristics, in which log husband's income or log husband's occupational prestige is used as a dependent variable, and spousal age and spousal age squared are additionally included as covariates.

Finally, the duration model and the count data model are used to explore the influence of family background on family formation. The Cox proportional hazard model of singlehood duration (d) can be written as

$$\lambda\left(d|\, z\right) = \lambda_0\left(d\right)\psi\left(z\left(d\right)\right), \tag{4}$$

where $z = [z_1, z_2, x]$, λ is the hazard function, λ_0 is a nonparametric baseline hazard, and $\psi\left(z\right) = \exp\left(z\delta\right)$. The data on duration until first marriage is constructed from retrospective information

[14]The regional unemployment rate data are available from the Labor Force Survey. Japan's 47 prefectures are classified into nine regions: Hokkaido, Tohoku, Southern Kanto, Northern Kanto and Koshin, Hokuriku, Tokai, Kinki, Chugoku and Shikoku, Kyushu and Okinawa.

about marriage history after the age of 15.[15] The Poisson count-data regression model of fertility is described by the probability mass function:

$$\Pr\left(C = c|\, z\right) = \exp\left[-\kappa\left(z\right)\right]\left[\kappa\left(z\right)\right]^{c}/\, c!, \qquad c = 0, 1, 2, \ldots, \tag{5}$$

where c is the number of children; and $c!$ denotes the factorial. The analysis uses the negative binomial model that extends the Poisson regression model in a way that relaxes the equidispersion property and accommodates overdispersion. The negative binomial model specifies $\kappa\left(z\right) = \mu\left(z\right)\nu$, where $\mu = \exp\left(z\eta\right)$, and ν is the gamma density with mean one and variance α. The mean and variance are, then, $\mathrm{E}[c|\, \mu, \alpha] = \mu$ and $\mathrm{Var}[c|\, \mu, \alpha] = \mu\left(1 + \alpha\mu\right)$, respectively.

To summarize, according to the nature of the outcome variables, this study uses the linear regression model for years of education, the probit model for having a university degree and attending a preparatory school, the ordered probit model for participating in private tutoring schools or enrichment courses, the sample selection model for own and spousal hourly wages and occupational prestige, the duration model for marriage, and the count data model for fertility. Because the nature of outcome variables differs across estimating models, the models are not estimated simultaneously. The estimates are mostly precise, however. The impact of sibling composition is specified in two ways to account for the gender composition of siblings and birth order for each outcome.

4 Results

4.1 Educational attainment

The first two columns of Table 6 present the results on years of education. Column 1 shows that the number of sisters and the number of brothers decrease years of education. Maternal education and paternal education increase children's years of education. The effects of sisters (maternal education) do not statistically differ from the effects of brothers (paternal education). Maternal age at birth has a positive effect, but its square has a negative effect, indicating that years of education

[15] The legal age for marriage is 18 for males and 16 for females. Parental consent is required if under the age of 20.

increase as maternal age at birth increases up to a certain age and then subsequently declines. The implied partial effect is 0.023, and the turning point is the age of 31. Prefecture effects are jointly statistically significant with a *p*-value of zero, and the effect of prefectural GDP is positive and marginally significant. Column 2 shows that eldest daughters tend to have 0.25 longer years of education than their younger sisters, holding sibship size constant. The inclusion of birth order does not substantially change the effects of parental attributes.

The next two columns present the results on university degrees. Column 3 shows that sibship size decreases the probability of holding a university degree. One additional sister decreases the probability by 3.1 (1.4) percentage points in a family without sisters (with one sister), while one additional brother decreases the probability by 4.6 (1.6) percentage points in a family without brothers (with one brother). The result that the effects of brothers are stronger than the effects of sisters is consistent with Ono (2004), who argues that family resources are allocated preferentially to investment in sons in Japan, using the Social Stratification and Mobility Survey.[16] Maternal education and paternal education increase the probability of holding a university degree. Maternal university degree has a greater impact than paternal university degree, which is similar to the result emphasized by Edwards and Pasquale (2003) in their analysis of a multinomial logit model of post-secondary education choice using the original cohorts of the JPSC. It should be noted, however, that the lower university advancement rate of women among the older generation underlies this result. A 10% increase in parental income increases the probability of holding a university degree by 1.21 percentage points. Prefecture effects are jointly statistically significant at the 2% level. Column 4 shows that eldest daughters are 3.6 percentage points more likely to hold a university degree. The effects of parental attributes do not change substantially after birth order is included. Given that the sample mean of the probability of holding a university degree is 17.4%, sibling composition, parental education, and parental income are economically significant.

[16]Powell and Steelman (1989) find that the number of brothers decreases the probability of receiving financial assistance for college education from parents more strongly than the number of sisters in the United States.

4.2 Educational investment

The direct implication derived from the quality-quantity theory is for the relation between family background and educational investment. The analysis of educational investment is conducted to provide an explanation of the difference in educational attainment by family background. The last two columns of Table 6 present the results for the probability of attending a preparatory school for university entrance examination. One additional sister decreases this probability by 2.5 percentage points in a family without sisters, while one additional brother decreases it by 1.6 (0.8) percentage points in a family without brothers (with one brother). Maternal education has a stronger influence than paternal education, and the two effects jointly statistically differ at the 15% level. Attendance at preparatory schools seems to reflect mother's willingness more than father's. A 10% increase in parental income increases the probability of attending a preparatory school by 0.53 percentage points. Eldest daughters are 2.7 percentage points more likely to attend a preparatory school. Overall, the results are similar to those for the analysis of educational attainment in terms of the signs of estimated coefficients. The difference in educational investment is thus considered as a factor of the difference in educational attainment by family background.

The difference may appear in investment in early education, such as private tutoring schools and enrichment courses. Private tutoring schools typically conduct small-group lessons and offer counseling to pass competitive exams. Attendance at private tutoring schools is prevalent in Japan and some other East Asian countries and can make a significant difference in students' academic performance.[17] Enrichment courses have been popular in Japan as a part of early education that can enhance children's ability in a broad sense. Typical subjects of enrichment courses in which Japanese children participate are sports (swimming, Judo, Kendo, gymnastics, baseball, soccer, etc.), calligraphy, music (piano, violin, etc.), abacus, English, and painting.[18] Table 7 classifies the

[17] Benesse (2007) summarizes the results of an international comparative survey on actual conditions of study and attitudes toward study, which was conducted for primary school students aged 10 and 11, in Tokyo, Seoul, Peking, Helsinki, London, and Washington, D.C., in 2006. The sample was composed of 1,105 students from 33 schools in Tokyo, 1,300 students from 19 schools in Seoul, 1,195 students from 14 schools in Peking, 526 students from 12 schools in Helsinki, 891 students from 19 schools in London, and 955 students from 11 schools in Washington, D.C. According to Benesse (2007), in 2006, 51.6% of students in Tokyo, 72.9% of students in Seoul, and 76.6% of students in Peking attended private tutoring schools, while 21.1% of students in Helsinki, 13.1% of students in London, and 7.2% of students in Washington, D.C. attended such schools. The average number of days a student attends private tutoring school per week is 2.8 in Tokyo, 4.8 in Seoul, and 2.2 in Peking, and the total number of hours of attendance at private tutoring school per week is 7.0 in Tokyo, 11.6 in Seoul, and 5.8 in Peking.

[18] According to Benesse (2007), in 1990, 43.5% of primary school students in Japan participated in sports, 31.4%

sample into five categories according to whether they attended private tutoring schools or enrichment courses at each level of education.[19] The proportion who participated in a private tutoring school increases from 11.8% between first and third grade, to 36.7% between fourth and sixth grade, rises to 57.7% in junior high school, and then decreases to 18.2% in high school, because many junior high school students prepare for the high school entrance examination, and because not all high school students aim to advance to college. The proportion of those who attended enrichment courses entailing tuition fees is 64.3% between first and third grade, 68.1% between fourth and sixth grade, 31.3% in junior high school, and 18.9% in high school. Enrichment courses are popular among elementary school students, but enrollment tends to shift toward private tutoring schools after late elementary school. Table 8 presents the regression results on investment in early education. Overall, family background variables are fairly significant, and the sign pattern of those estimated coefficients is the same as in the analysis of educational attainment. Investment in early education is also considered as a factor behind the difference in educational attainment by family background.

4.3 Changes in family background effects

In keeping with the spirit of Article 26 of the Constitution, tuition, enrollment, and examination fees were set uniformly for all departments of all national universities until 2003. However, the financial burden of higher education has substantially increased in the last few decades due to a rise in college tuition fees and an increased need for preparatory schools. Tightening credit constraints may increase the impact of family background on educational attainment.

Table 9 presents the results for the probability of holding a university degree when the sample is split into cohorts of those born between 1959 and 1969 and those born between 1970 and 1979. The proportion of those who hold a university degree is 13% for the 1960s cohorts and 22% for the 1970s cohorts. The average number of siblings is 1.48 for the 1960s cohorts and 1.43 for the 1970 cohorts, and the proportion of eldest daughters is 73.3% for the 1960s cohorts and 68.5% for the 1970s cohorts. Some family background variables have a greater impact for the 1970s cohorts than

in calligraphy, 27.0% in music, 17.5% in abacus, 13.2% in English, and 2.1% in painting.

[19] Those who studied with private tutors are classified as having attended private tutoring schools.

for the 1960s cohorts. In particular, a 10% increase in parental income increases the probability of holding a university degree by 1.50 percentage points for the 1970s cohorts as opposed to 0.90 percentage points for the 1960s cohorts. Moreover, the impact of sibship size is greater for the younger cohorts. However, because the effects of sisters increase more than the effects of brothers, the difference in the effects of sisters and brothers disappears for the 1970s cohorts, indicating that there is no preferential allocation to investment in sons for the younger cohorts. This change is considered as a factor contributing to the reduction of the gender gap in education in recent decades. Maternal education and paternal education have slightly larger effects for the younger cohorts, while maternal age at birth has a significant effect only for the older cohorts. The size of birth order effect is unchanged. Prefecture effects are jointly statistically significant for the 1960s cohorts at the 5% level but not for the 1970s cohorts at the 24% level, and the estimated coefficient of the log real prefectural GDP is 0.64 with a standard error of 0.26 for the 1960s cohorts but small and insignificant with a p-value of 0.53 for the 1970s cohorts. These results suggest a fall in regional disparity in educational attainment conditional on family background. The effect of student–teacher ratio is close to zero and insignificant for the 1960s cohorts, and negative and insignificant for the 1970s cohorts.

4.4 Labor market outcomes

The first two columns in Table 10 present the results for wages, and the last two columns present the results for occupational prestige. Column 1 shows that the number of sisters and the number of brothers decrease wages. One additional sister decreases wages by 6.6 (2.5) percentage points in a family without sisters (with one sister), while one additional brother decreases wages by 7.9 (11.0) percentage points in a family without brothers (with one brother). These results can be interpreted as a consequence of the effects of brothers on university degrees being stronger than the effects of sisters. Maternal education, especially maternal university degree, significantly increases wages, whereas paternal education does not. A 10% increase in parental income increases wages by 1.95%. Column 2 shows that eldest daughters tend to earn 8.3% higher wages. These results are

consistent with the results for educational attainment and investment.[20] The last two columns show that larger sibship size decreases occupational prestige. Maternal education, paternal education, and parental income increase occupational prestige. Eldest daughters tend to have 2.5% higher occupational prestige scores. Overall, the signs of family background effects are mostly the same for educational attainment and investment, wages, and occupational prestige, and the impact of family background is found to persist in the labor market.

An analysis of employment was also conducted, in which the outcome variable takes a value of one if the individual is employed and a value of zero if she is unemployed or is a housewife. Except for birth order, family background characteristics have no significant effect on employment. The result regarding birth order is consistent with that of Sasaki's (2002), who finds that the eldest son and the eldest daughter are more likely to live with parents and that co-residence with parents increases the probability of labor market participation among married women, using the original cohorts of the JPSC. Similar results were obtained for the ordered probit model in which the outcome variable takes a value of two if an individual is a full-time employee, a value of one if she is a part-time or temporary employee, and a value of zero if she is not employed. There seem to be two effects cancelling each other out behind the unclear results of family background effects on employment status. Higher productivity resulting from better family background increases the probability of being employed, while the income effect resulting from better family background reduces the probability of being employed.

4.5 Family formation

The first half of the columns in Table 11 presents the results on fertility and singlehood duration. The first two columns show that a larger number of sisters or brothers accelerates the timing of marriage. Higher maternal education delays the timing of marriage, whereas higher paternal edu-

[20] Education is the most likely channel linking family background and wages. Family background variables may be useful as instruments to estimate the returns to education. The two-stage least squares estimate is 9.8% when father's and mother's years of education are used as instruments and 26.1% when the numbers of brothers and sisters are used as instruments, while the pooled OLS estimate of returns to education is 11.7%. Other covariates included are a constant, age, age squared, maternal age at birth, father's occupation dummies, year dummies, and dummies for the size of city where one lives currently. The results can be interpreted along the lines of Card (2001). Because the marginal returns to education can be expressed as the weighted sum of two parameters regarding innate ability and the extent of credit constraints, the two-stage least squares estimate of returns to education is highest (lowest) when the instrument used affects high-ability (low-ability) and credit-constrained (credit-unconstrained) individuals.

cation does not. Higher maternal age at birth or higher parental income lengthens the singlehood duration of children. Eldest daughters tend to delay the timing of marriage. The relative frequency of number of children is 42.3 for zero, 15.2 for one, 29.8 for two, and 12.7 for three or more, and the average number of children is 1.15. The next two columns show that the number of sisters and the number of brothers increase fertility. Maternal education, paternal education, and parental income decrease fertility. Birth order has no significant effect on fertility. Overall, family background affects family formation, and the direction of family background effects on marriage and fertility is the opposite of the direction of family background effects on educational attainment and labor market outcomes. The results suggest that women who have higher opportunity costs tend to delay marriage and have fewer children.

4.6 Spousal characteristics

The last half of the columns in Table 11 presents the results for husband's income and occupational prestige. Columns 5 and 6 show that sibship size decreases husband's income. The effects of brothers are more significant than the effects of sisters. Paternal education increases husband's income, whereas maternal education does not. Lastly, a 10% increase in parental income increases spousal income by 1.31%. These results can be interpreted as a consequence of assortative mating. Similarly, the last two columns show significant family background effects on the social status of the husband. The number of sisters and the number of brothers decrease husband's occupational prestige. Maternal education, paternal education, and parental income increase husband's occupational prestige. The partial effect of maternal age at birth is positive and significant, and the optimal age is 30 years. Overall, family background is significantly associated with spousal characteristics, and the direction of family background effects on the economic and social status of the husband is the same as the direction of family background effects on educational attainment and investment and labor market outcomes. The sign of the estimated effects would be somewhat surprising if one expected a decline in the quality of those remaining single. The results suggest that assortative mating plays an important role in intergenerational transmission of economic and social status.

5 Conclusion

This paper has examined the impact of family background on educational attainment and investment, labor market outcomes, family formation, and spousal characteristics for Japanese women. To summarize the main findings, those who are raised with a small number of siblings by educated and rich parents tend to attend private tutoring schools, enrichment courses, and preparatory schools for university entrance examination, advance their education, obtain high-status occupations, and earn higher wages. They are more likely to delay marriage and have fewer children because of higher opportunity costs but tend to marry men who have high income and high-status occupations as a consequence of assortative mating. Maternal education has a stronger influence on labor market outcomes and the timing of marriage than paternal education, while paternal education has a stronger influence on the economic and social status of the husband than maternal education. The effects of brothers on educational attainment and wages are stronger than the effects of sisters, suggesting that family resources are allocated preferentially to investment in sons. Tightening credit constraints has increased the impact of sibship size and parental income on university degrees over recent decades, but the difference between the effects of brothers and those of sisters has disappeared for the younger cohorts. This change in the impact of siblings' gender composition of siblings is considered as a factor in rising female education.

Appendix

Occupational prestige scores

In the JPSC, occupation is classified into 15 categories: (1) self-employed worker in agriculture, forestry, or fishery, (2) family worker in agriculture, forestry, or fishery, (3) self-employed worker in a small-sized commercial, industrial, or service business with fewer than 10 employees, (4) family worker in a small-sized commercial, industrial, or service business with fewer than 10 employees, (5) freelance professional (practicing physician, lawyer, writer, priest, flower arrangement teacher, dancer, etc.), (6) managerial job (department manager or above in a company, section chief or above in a public agency, etc.), (7) professional (doctor in a hospital, researcher, research associate or above in a university, judge, etc.), (8) technician (engineer, programmer, nurse, dietitian, etc.), (9) teacher (teacher in an elementary school, junior high school, senior high school, vocational school, professional school, or kindergarten), (10) clerical job (clerical staff, sales staff, bank clerk, etc.), (11) craft and laborer job (factory worker, police, telephone operator, typist, deliveryman, driver, craftsman, etc.), (12) sales and service job (shop employee, salesperson, barber, hairdresser, waiter, home-care worker, etc.), (13) home worker, (14) other, and (15) not employed.

The occupational prestige scores used in this study are based on the results of Treiman (1977) for occupational prestige scores in Japan. The means of occupational prestige scores for the occupational titles on the list in Treiman (1977) are given for each occupational category. The regression results are essentially unchanged when the median is used instead of the mean. Table A1 enumerates occupational prestige scores for each occupational category, along with the occupational titles that are included in the category.[21]

[21] The rest of the occupational titles, such as captain of a large merchant ship, president of the Supreme Court, rector at the University of Tokyo, manager of a professional baseball team, prime minister, prefect, president of the diet, member of the diet, minister of state, union leader, secretary general of a large labor union, sleeping car porter, peddler/street stall keeper, shoe shiner, gold miner/coal miner, and charcoal miner, are not used in the analysis.

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Table 1: How much of your tuition fees and living expenses for school did your parents cover?

	(1) Vocational School	(2) Two-year College	(3) Four-year College
Almost all	62.6%	79.5%	71.1%
Most	13.0	13.9	21.1
Some	10.1	3.3	4.9
Little	14.0	3.1	2.6
No response	0.4	0.2	0.2
Observations	516	541	426

Table 2: Parental Income and Children's Education

	(1)	(2)	(3)
	Parental Income		
	Low	Middle	High
Yrs. education = 9	6.0%	2.4%	1.3%
= 12	50.0	32.9	17.0
= 14	35.4	44.0	43.4
≥ 16	8.6	20.7	38.4
Observations	1,092	860	318

Notes: Parental income per year for the low-, middle-, and high-income groups is less than five million yen, greater than or equal to five million yen but less than 10 million yen, and greater than or equal to 10 million yen, respectively. Parental income is the average parental income over the sample period.

Table 3: Educational Assortative Mating

	Husband's years of education				Total
	= 9	= 12	= 14	≥ 16	
Years of education = 9	34	29	5	3	71
= 12	76	384	97	105	662
= 14	35	202	110	252	599
≥ 16	1	18	19	162	200
Total	146	633	231	522	1,532

Table 4: Summary Statistics

(1)		(2)		(3)	
	Percent		Percent		Mean [S.D.]
No. of siblings		Yrs. education		Age	27.42 [2.83]
0	6.96	9	4.01		
1	52.20	12	38.90	No. of siblings	1.46 [0.87]
2	32.42	14	39.74		
3+	8.4	16+	17.36	No. of sisters	0.74 [0.76]
No. of sisters		Mother's yrs. education		No. of brothers	0.72 [0.74]
0	42.07	9	33.08		
1	45.81	12	50.44	Mother's yrs.	11.42 [1.94]
2+	12.11	14	12.47	education	
		16+	4.01	Father's yrs.	11.82 [2.48]
No. of brothers				education	
0	41.98	Father's yrs. education		Maternal age	27.35 [3.92]
1	44.36	9	33.88	at birth	
2+	13.66	12	42.60	Father's age	57.72 [5.24]
		14	5.29		
Eldest daughter	70.97	16+	18.24	Parental income	6.81 [4.09]
Second daughter	24.80			(millions of yen)	

Notes: A total of 2,270 individuals are included. Parental income is the average parental income over the sample period.

Table 5: Intergenerational Correlations

	Age-adjusted Correlation Coefficients	Observations
(1) Own and maternal education	0.360 {0.00}	2,270
(2) Own and paternal education	0.395 {0.00}	2,270
(3) Own wages and parental income	0.199 {0.00}	1,722
(4) Own occupational prestige and paternal income	0.140 {0.00}	1,880
(5) No. of children and no. of siblings	0.096 {0.00}	2,270
(6) Age at first marriage and maternal age at birth	0.061 {0.01}	1,532
(7) Spousal and parental income	0.244 {0.00}	1,424
(8) Spousal occupational prestige and parental income	0.280 {0.00}	1,525

Notes: Figures in curly brackets are *p*-values. The average values over the sample period are used for parental income, wages, occupational prestige, and spousal income, and the value in the last observation is used for the number of children. The correlation coefficient in rows (3), (4), and (5) is adjusted by partialling out age, age squared, father's age, and father's age squared. Husband's age and husband's age squared are additionally partialled out in rows (7) and (8). The correlation coefficient in row (6) is adjusted by partialling out age and age squared.

Table 6: Educational Attainment and Investment

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS		Probit		Probit	
	Years of Education		University Degrees: = 1		Preparatory School: = 1	
No. of sisters = 1	-0.289	_	-0.031	_	-0.025	_
	(0.077)		(0.017)		(0.012)	
≥ 2	-0.505	_	-0.045	_	-0.017	_
	(0.107)		(0.020)		(0.015)	
No. of brothers = 1	-0.279	_	-0.046	_	-0.016	_
	(0.076)		(0.017)		(0.012)	
≥ 2	-0.528	_	-0.062	_	-0.024	_
	(0.116)		(0.019)		(0.015)	
Eldest daughter	_	0.245	_	0.036	_	0.027
		(0.077)		(0.016)		(0.011)
No. of siblings = 1	_	-0.135	_	-0.047	_	-0.026
		(0.137)		(0.028)		(0.020)
= 2	_	-0.342	_	-0.069	_	-0.023
		(0.144)		(0.025)		(0.018)
≥ 3	_	-0.666	_	-0.045	_	-0.030
		(0.187)		(0.029)		(0.019)
Mother's yrs.	0.371	0.360	0.039	0.056	0.067	0.065
education = 12	(0.085)	(0.084)	(0.021)	(0.022)	(0.017)	(0.017)
	0.451	0.435	0.078	0.107	0.126	0.122
= 14	(0.132)	(0.130)	(0.036)	(0.038)	(0.040)	(0.039)
	1.226	1.201	0.366	0.412	0.287	0.279
≥ 16	(0.170)	(0.170)	(0.073)	(0.072)	(0.077)	(0.076)
Father's yrs.	0.368	0.367	0.079	0.099	0.010	0.010
education = 12	(0.084)	(0.084)	(0.023)	(0.023)	(0.016)	(0.016)
	0.492	0.481	0.062	0.087	0.024	0.021
= 14	(0.159)	(0.158)	(0.047)	(0.050)	(0.032)	(0.031)
	1.074	1.057	0.247	0.313	0.089	0.086
≥ 16	(0.116)	(0.115)	(0.041)	(0.042)	(0.029)	(0.029)
Maternal age at birth	0.203	0.221	0.023	0.037	0.006	0.009
	(0.092)	(0.094)	(0.022)	(0.024)	(0.013)	(0.014)
Maternal age at birth	-0.329	-0.351	-0.043	-0.069	-0.007	-0.012
squared/100	(0.163)	(0.165)	(0.038)	(0.042)	(0.024)	(0.024)
log parental income	0.783	0.779	0.121	0.121	0.053	0.052
	(0.065)	(0.065)	(0.014)	(0.014)	(0.011)	(0.011)
Mean [S.D] of regressand	13.4 [1.71]		0.174 [0.379]		0.102 [0.302]	
(Pseudo) *R*-squared	0.29	0.29	0.22	0.22	0.21	0.21

Notes: A total of 2,270 individuals are included from columns 1 to 4, and a total of 2,261 individuals are included in columns 5 and 6. Partial effects are reported in all columns. Heteroscedasticity-robust standard errors are in parentheses. The other covariates are a constant, age, age squared, father's age, father's age squared, the log prefectural real GDP at the age of 16, and dummies for the prefecture where one spent childhood. The base group comprises those who have no siblings and whose parents have less than 12 years of education.

Table 7: Do you have experience attending private tutoring school, enrichment courses, or both?

	(1) Grades 1–3	(2) Grades 4–6	(3) Junior High	(4) High School
Both	6.6%	22.7%	21.9%	5.8%
Private tutoring school	5.2	14.0	35.8	12.4
Enrichment courses	57.7	45.4	9.4	13.1
Neither	29.4	17.5	31.8	67.3
No response	1.1	0.5	1.1	1.5
Observations	2,648		2,605	

Table 8: Investment in Early Education Outside of School

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Ordered Probit Both Private Tutoring School and Enrichment Courses: = 2 Either: = 1 Neither: = 0							
	Grades 1–3		Grades 4–6		Junior High		High School	
No. of sisters = 1	-0.215	–	-0.271	–	-0.179	–	-0.184	–
	(0.063)		(0.059)		(0.059)		(0.065)	
≥ 2	-0.550	–	-0.505	–	-0.360	–	-0.360	–
	(0.090)		(0.087)		(0.082)		(0.101)	
No. of brothers = 1	-0.090	–	-0.149	–	-0.013	–	-0.156	–
	(0.063)		(0.059)		(0.058)		(0.065)	
≥ 2	-0.359	–	-0.432	–	-0.151	–	-0.216	–
	(0.094)		(0.089)		(0.084)		(0.103)	
Eldest daughter	–	0.111	–	0.190	–	0.239	–	0.219
		(0.063)		(0.059)		(0.058)		(0.068)
No. of siblings = 1	–	-0.191	–	-0.274	–	0.117	–	-0.006
		(0.110)		(0.104)		(0.104)		(0.107)
= 2	–	-0.368	–	-0.414	–	-0.030	–	-0.182
		(0.116)		(0.108)		(0.108)		(0.114)
≥ 3	–	-0.664	–	-0.754	–	-0.174	–	-0.253
		(0.143)		(0.136)		(0.134)		(0.154)
Mother's yrs.	0.262	0.257	0.305	0.296	0.270	0.258	0.206	0.194
education = 12	(0.078)	(0.078)	(0.069)	(0.069)	(0.065)	(0.065)	(0.080)	(0.080)
	0.262	0.261	0.302	0.294	0.317	0.302	0.393	0.382
= 14	(0.109)	(0.109)	(0.104)	(0.104)	(0.099)	(0.099)	(0.109)	(0.110)
	0.275	0.253	0.174	0.144	0.160	0.127	0.423	0.404
≥ 16	(0.151)	(0.152)	(0.157)	(0.160)	(0.160)	(0.161)	(0.145)	(0.147)
Father's yrs.	0.267	0.267	0.153	0.155	0.086	0.081	0.078	0.073
education = 12	(0.076)	(0.076)	(0.067)	(0.068)	(0.066)	(0.066)	(0.080)	(0.080)
	0.252	0.253	0.252	0.248	0.327	0.320	0.248	0.235
= 14	(0.140)	(0.140)	(0.123)	(0.123)	(0.123)	(0.121)	(0.143)	(0.142)
	0.312	0.306	0.243	0.233	0.295	0.283	0.410	0.400
≥ 16	(0.096)	(0.096)	(0.093)	(0.094)	(0.092)	(0.092)	(0.101)	(0.101)
Maternal age at birth	0.074	0.083	-0.015	0.001	0.037	0.050	-0.016	-0.001
	(0.069)	(0.070)	(0.064)	(0.064)	(0.061)	(0.062)	(0.071)	(0.072)
Maternal age at birth	-0.130	-0.143	0.041	0.019	-0.062	-0.075	0.059	0.043
squared/100	(0.122)	(0.124)	(0.112)	(0.113)	(0.107)	(0.109)	(0.125)	(0.126)
log parental income	0.399	0.396	0.352	0.350	0.384	0.383	0.471	0.474
	(0.055)	(0.055)	(0.051)	(0.051)	(0.049)	(0.049)	(0.056)	(0.056)

Notes: The number of observations is 2,244 in columns 1 and 2, 2,259 in columns 3 and 4, 2,248 in columns 5 and 6, and 2,238 individuals in columns 7 and 8, respectively. Heteroscedasticity-robust standard errors are in parentheses. The other covariates are a constant, age, age squared, father's age, father's age squared, the log prefectural real GDP at the age of 16, and dummies for the prefecture where one spent childhood.

Table 9: Changes in the Family Background Effects

	(1)	(2)	(3)	(4)
	Probit			
	University Degrees: = 1			
	1960s Cohort		1970s Cohort	
No. of sisters = 1	-0.010	–	-0.055	–
	(0.019)		(0.030)	
≥ 2	-0.035	–	-0.070	–
	(0.021)		(0.034)	
No. of brothers = 1	-0.032	–	-0.053	–
	(0.019)		(0.029)	
≥ 2	-0.047	–	-0.069	–
	(0.021)		(0.033)	
Eldest daughter	–	0.045	–	0.044
		(0.018)		(0.027)
No. of siblings = 1	–	0.005	–	-0.102
		(0.030)		(0.048)
= 2	–	-0.012	–	-0.125
		(0.031)		(0.042)
≥ 3	–	-0.029	–	-0.051
		(0.033)		(0.050)
Mother's yrs.	0.018	0.014	0.066	0.064
education = 12	(0.022)	(0.022)	(0.041)	(0.041)
	0.097	0.096	0.077	0.076
= 14	(0.052)	(0.052)	(0.059)	(0.057)
	0.383	0.380	0.407	0.395
≥ 16	(0.133)	(0.133)	(0.098)	(0.098)
Father's yrs.	0.086	0.083	0.092	0.095
education = 12	(0.026)	(0.026)	(0.039)	(0.039)
	0.012	0.006	0.127	0.141
= 14	(0.049)	(0.047)	(0.085)	(0.087)
	0.256	0.245	0.290	0.293
≥ 16	(0.060)	(0.059)	(0.061)	(0.061)
Maternal age at birth	0.052	0.054	0.009	0.018
	(0.023)	(0.024)	(0.036)	(0.037)
Maternal age at birth	-0.100	-0.104	-0.009	-0.023
squared/100	(0.042)	(0.042)	(0.063)	(0.065)
log parental income	0.090	0.088	0.150	0.151
	(0.018)	(0.018)	(0.023)	(0.023)
Mean [S.D] of regressand	0.13 [0.34]		0.22 [0.41]	
(Pseudo) R-squared	0.23	0.24	0.23	0.23

Notes: A total of 1,178 observations are included in columns 1 and 2, and a total of 1,092 observations are included in columns 3 and 4. Partial effects are reported in all columns. Heteroscedasticity-robust standard errors are in parentheses. The other covariates are a constant, age, age squared, father's age, father's age squared, the log prefectural real GDP at the age of 16, the student–teacher ratio at the age of 16, and dummies for the prefecture where one spent childhood.

Table 10: Labor Market Outcomes

	(1)	(2)	(3)	(4)
	Sample Selection		Sample Selection	
	log Hourly Wages		log Occupational Prestige	
No. of sisters = 1	-0.066	_	-0.033	_
	(0.035)		(0.010)	
≥ 2	-0.091	_	-0.042	_
	(0.060)		(0.014)	
No. of brothers = 1	-0.079	_	-0.014	_
	(0.035)		(0.010)	
≥ 2	-0.189	_	-0.052	_
	(0.057)		(0.015)	
Eldest daughter	_	0.083	_	0.025
		(0.032)		(0.010)
No. of siblings = 1	_	-0.057	_	-0.007
		(0.059)		(0.017)
= 2	_	-0.130	_	-0.031
		(0.068)		(0.018)
≥ 3	_	-0.148	_	-0.051
		(0.092)		(0.022)
Mother's yrs.	0.024	0.024	0.025	0.024
education = 12	(0.046)	(0.046)	(0.011)	(0.011)
	0.107	0.108	0.060	0.058
= 14	(0.069)	(0.069)	(0.017)	(0.017)
	0.210	0.207	0.071	0.069
≥ 16	(0.096)	(0.096)	(0.024)	(0.025)
Father's yrs.	-0.016	-0.009	0.004	0.004
education = 12	(0.041)	(0.041)	(0.011)	(0.011)
	-0.017	-0.019	0.009	0.008
= 14	(0.068)	(0.069)	(0.022)	(0.022)
	0.000	-0.003	0.044	0.042
≥ 16	(0.067)	(0.067)	(0.015)	(0.015)
Maternal age at birth	-0.022	-0.011	0.017	0.018
	(0.049)	(0.049)	(0.012)	(0.012)
Maternal age at birth	0.037	0.022	-0.026	-0.028
squared/100	(0.087)	(0.087)	(0.021)	(0.021)
log parental income	0.195	0.192	0.036	0.036
	(0.040)	(0.040)	(0.009)	(0.009)
Correlation coefficient	-0.971	-0.971	-0.054	-0.054
	(0.008)	(0.008)	(0.045)	(0.046)

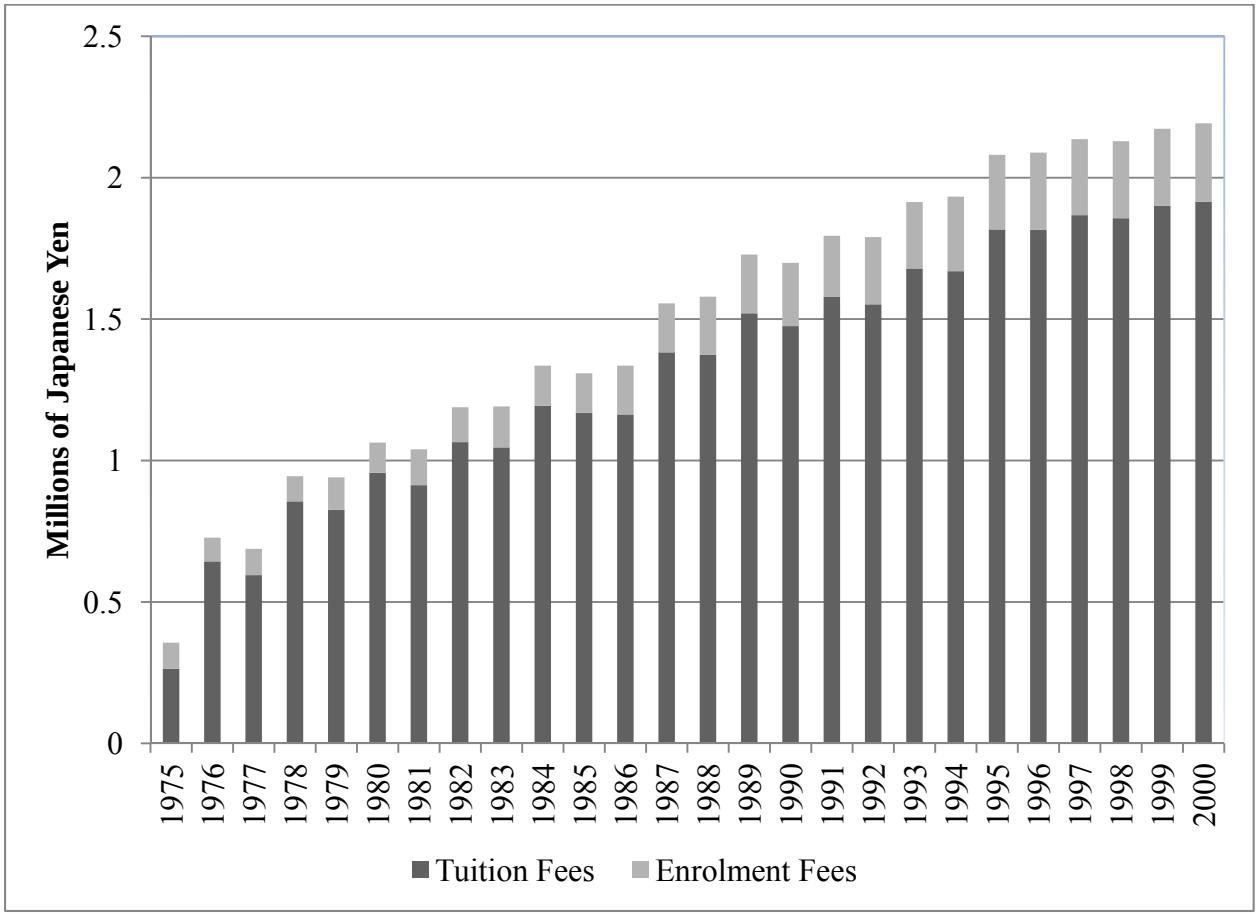
Notes: A total of 2,270 individuals are included. Heteroscedasticity-robust standard errors are in parentheses. The other covariates are a constant, age, age squared, father's age, father's age squared, the log prefectural real GDP at the age of 16, and dummies for the prefecture where one spent childhood. The models are estimated by the maximum likelihood method.

Table 11: Family Formation and Spousal Characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Cox Proportional Hazard		Negative Binomial		Sample Selection		Sample Selection	
	Singlehood Duration		No. of Children		log Spousal Income		log Spousal Occupational Prestige	
No. of sisters = 1	0.049	–	0.059	–	-0.019	–	-0.025	–
	(0.060)		(0.044)		(0.021)		(0.012)	
≥ 2	0.220	–	0.098	–	-0.012	–	-0.054	–
	(0.083)		(0.057)		(0.030)		(0.015)	
No. of brothers = 1	-0.017	–	0.029	–	-0.031	–	-0.021	–
	(0.059)		(0.044)		(0.021)		(0.011)	
≥ 2	0.202	–	0.221	–	-0.071	–	-0.042	–
	(0.093)		(0.064)		(0.032)		(0.015)	
Eldest daughter	–	-0.159	–	-0.031	–	-0.019	–	0.027
		(0.061)		(0.046)		(0.021)		(0.011)
No. of siblings = 1	–	0.058	–	0.064	–	-0.048	–	0.042
		(0.103)		(0.084)		(0.037)		(0.020)
= 2	–	0.125	–	0.103	–	-0.076	–	0.007
		(0.107)		(0.087)		(0.039)		(0.021)
≥ 3	–	0.238	–	0.273	–	-0.064	–	-0.017
		(0.139)		(0.101)		(0.048)		(0.025)
Mother's yrs.	-0.146	-0.143	-0.044	-0.045	0.016	0.017	0.023	0.022
education = 12	(0.066)	(0.066)	(0.048)	(0.048)	(0.024)	(0.024)	(0.012)	(0.012)
	-0.176	-0.178	-0.188	-0.183	-0.020	-0.020	0.046	0.045
= 14	(0.100)	(0.100)	(0.091)	(0.091)	(0.036)	(0.036)	(0.020)	(0.020)
	-0.459	-0.452	-0.106	-0.100	-0.007	0.000	0.050	0.046
≥ 16	(0.158)	(0.159)	(0.161)	(0.161)	(0.073)	(0.073)	(0.035)	(0.036)
Father's yrs.	0.010	0.009	-0.061	-0.061	-0.010	-0.008	0.003	0.001
education = 12	(0.065)	(0.065)	(0.047)	(0.047)	(0.024)	(0.024)	(0.012)	(0.012)
	-0.011	0.002	-0.002	-0.002	0.048	0.048	0.001	0.001
= 14	(0.124)	(0.123)	(0.094)	(0.093)	(0.046)	(0.046)	(0.022)	(0.022)
	-0.085	-0.072	-0.205	-0.200	0.071	0.072	0.057	0.057
≥ 16	(0.093)	(0.094)	(0.084)	(0.083)	(0.035)	(0.035)	(0.019)	(0.019)
Maternal age at birth	-0.135	-0.150	-0.048	-0.049	-0.019	-0.019	0.024	0.025
	(0.056)	(0.056)	(0.041)	(0.041)	(0.024)	(0.024)	(0.010)	(0.010)
Maternal age at birth	0.213	0.235	0.058	0.058	0.024	0.023	-0.041	-0.041
squared/100	(0.100)	(0.101)	(0.073)	(0.073)	(0.042)	(0.042)	(0.017)	(0.017)
log parental income	-0.225	-0.222	-0.226	-0.223	0.131	0.132	0.078	0.077
	(0.053)	(0.053)	(0.041)	(0.041)	(0.020)	(0.020)	(0.010)	(0.010)
Correlation coefficient	–	–	–	–	0.638	0.638	-0.032	-0.020
					(0.094)	(0.093	(0.103)	(0.107)

Notes: In columns 1 and 2, a total of 25,630 observations from 2,270 individuals are included, and standard errors in parentheses are clustered at the individual level. In columns 3 to 8, a total of 2,270 individuals are included, and heteroscedasticity-robust standard errors are in parentheses. Partial effects are reported in all columns. The other covariates are a constant, age, age squared, father's age, father's age squared, the log prefectural real GDP at the age of 16, and dummies for the prefecture where one spent childhood. Husband's age and husband's age squared are additionally included in columns 5 to 8. The models are estimated by the maximum likelihood method.

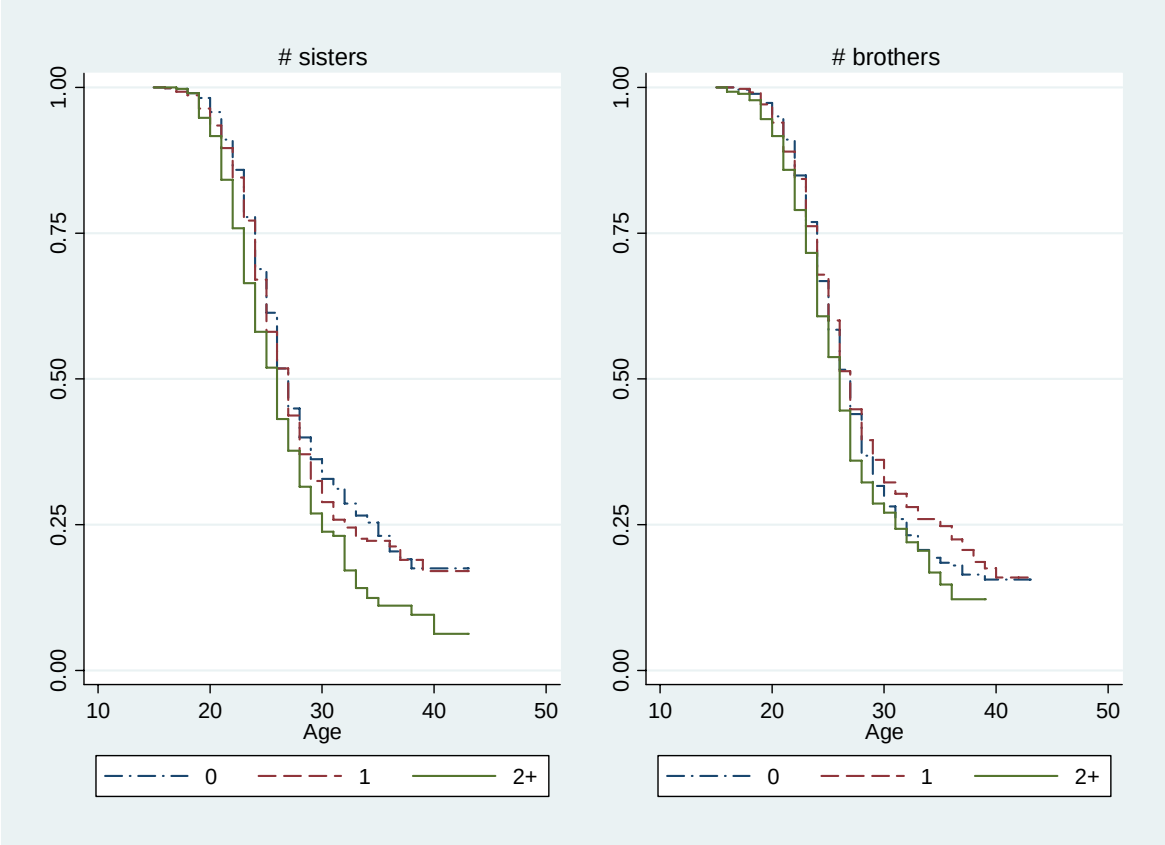
Figure 1: Costs for National Universities



Notes: Costs for national universities are calculated by enrollment fees plus tuition fees for four years and normalized by the consumer price index (the base year is 2000).

Figure 2: Kaplan-Meiler Estimates for the Survival Function of Singlehood Duration

Panel A: Number of Siblings



Panel B: Parental Education

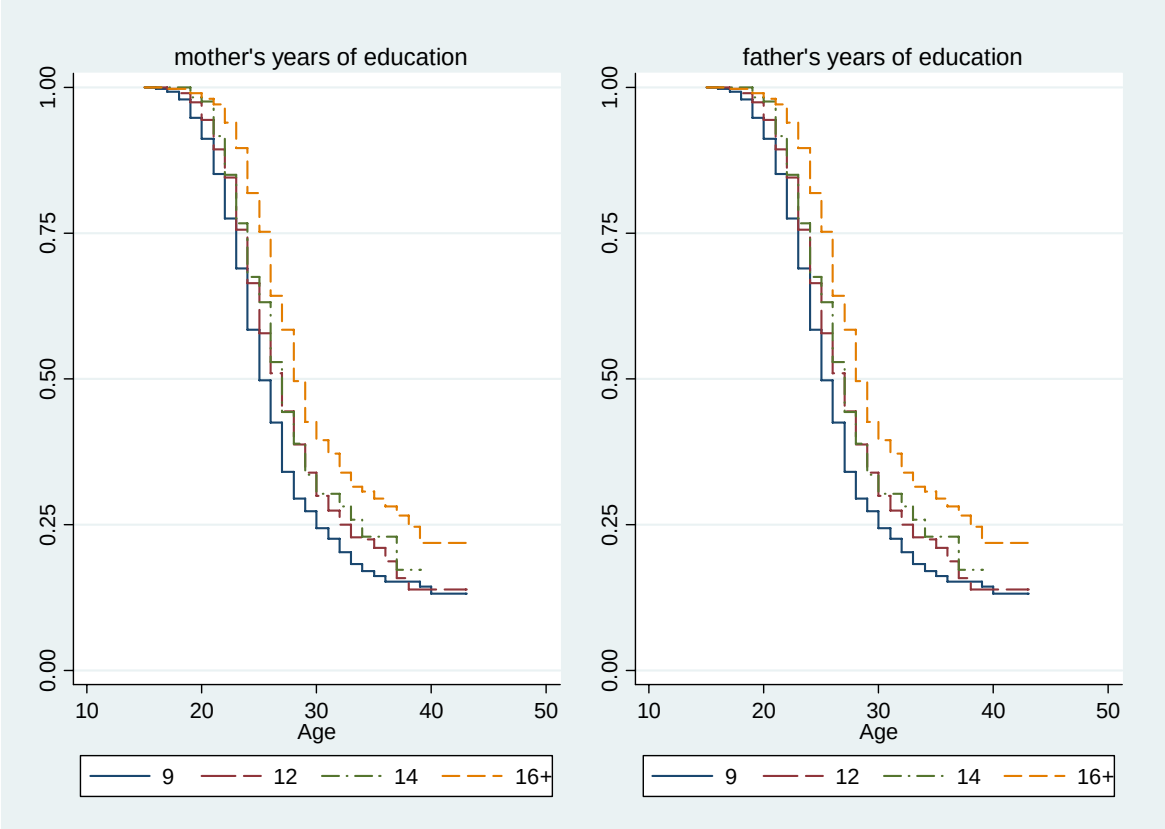


Table A1: Occupational Prestige Scores

	JPSC Category	Prestige Scores	Occupational Titles in Treiman (1977)
(1)	Self-employed in agriculture	33.8	Farm owner/head of a family farm, tenant farmer, agricultural laborer, fisherman, operator of a fishing boat, harpooner on a whaleboat
(2)	Family worker in agriculture	33.5	Unpaid family farm worker
(3)	Self-employed	38.8	Shopkeeper/owner of a green grocery shop
(4)	Family worker	34.7	Department store salesman/shop clerk/supermarket sales clerk/salesman in a bookstore/hardware store clerk/sales clerk in green grocery, barber, hair dresser, operator of a hair dressing salon
(5)	Freelance professional	62.1	Lawyer, director of a large hospital, priest in a Buddhist temple, novelist, composer, actor/movie performer, cinema director, television announcer
(6)	Managerial job	63.8	Department head in a government agency, department head in a municipal office, president of a large company, owner of a medium or small factory, department head in a private company, department head in a large company, officer of a large company/corporate executive
(7)	Professional	76.5	Physicist, airline pilot, botanist, cancer researcher, physician/ophthalmologist, economist, judge, local court judge, university professor
(8)	Technician	57.4	Civil engineer, electrical engineer, mechanical engineer, mining engineer, nurse, newspaper reporter, engineer on new Tokaido line/steam locomotive engineer/electric train engineer
(9)	Teacher	56.0	Elementary school teacher
(10)	Clerical job	45.2	Private secretary, office employee in a large company/office worker in a private company/office employee in a large spinning mill, office worker in a government office, airline office employee/office employee in the Tokyo central railroad station/railroad station office employee
(11)	Craft and laborer job	33.8	Policeman, spinner in a large hill/textile spinning machine operator, worker in a macaroni factory/worker in a bread bakery/worker in udon factory, tailor, furniture maker, turner, automobile repairman, operator of a service station, printer, carpenter, master carpenter, construction laborer, generator operator in a new and powerful steam power plant/generator operator in a steam power plant, porter, bus driver, driver/driver of a mail truck/driver of a garbage truck, road worker, air force enlisted man/army enlisted man
(12)	Sales and service job	34.6	Insurance agent, department store salesman/shop clerk/supermarket sales clerk/salesman in a bookstore/hardware store clerk/sales clerk in green grocery, automobile salesman, filling station attendant, hotel keeper, head clerk in a Japanese style inn, barber, hair dresser, operator of a hair dressing salon, bell captain in a hotel.